

Weights and Wing-lengths of Some Trinidad Birds¹

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(Text-figure 1)

INTRODUCTION

ALTHOUGH it is nearly 20 years since Amadon (1943) drew attention to the fact that the weight of a bird is the most satisfactory single measure of its size, in most studies involving the size of birds wing-length still has to be used as the measure, as too few weights are available. Great numbers of weights are now being recorded for some north-temperate species, especially migrants trapped at banding stations. But so far comparatively few weights of tropical species have been published, though for the neotropical region mention must be made of Haverschmidt's data from Surinam (Haverschmidt, 1948, 1952) and the bird weights from Trinidad already recorded by Junge & Mees (1958)². Hence it seems worth while summarizing over 4,000 weights which we collected in the course of 3½ years' trapping of birds in Trinidad. Wing-lengths are also given for the larger samples, primarily so that the coefficients of variation of weight and wing-length can be compared.

ACKNOWLEDGMENTS

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²The specimens collected by Mees were weighed after they had been stored for some time in a frozen condition (G. F. Mees, *in litt.*). Especially in the smaller species, this evidently involved some loss of weight, as is most evident when the weights of hummingbirds recorded by Junge & Mees are compared with those given here.

as we ourselves used, and are incorporated with those obtained by us. We would also like to acknowledge the help given by members of the Trinidad Regional Virus Laboratory. A large number of the weights recorded here were obtained while one of us was taking part in the field studies of the laboratory, and the weighing added significantly to the time taken over work which was primarily virological. R. E. Moreau kindly criticized this paper in draft. The whole program, of which this study forms a part, was generously supported by National Science Foundation grants G 4385 and G 21007.

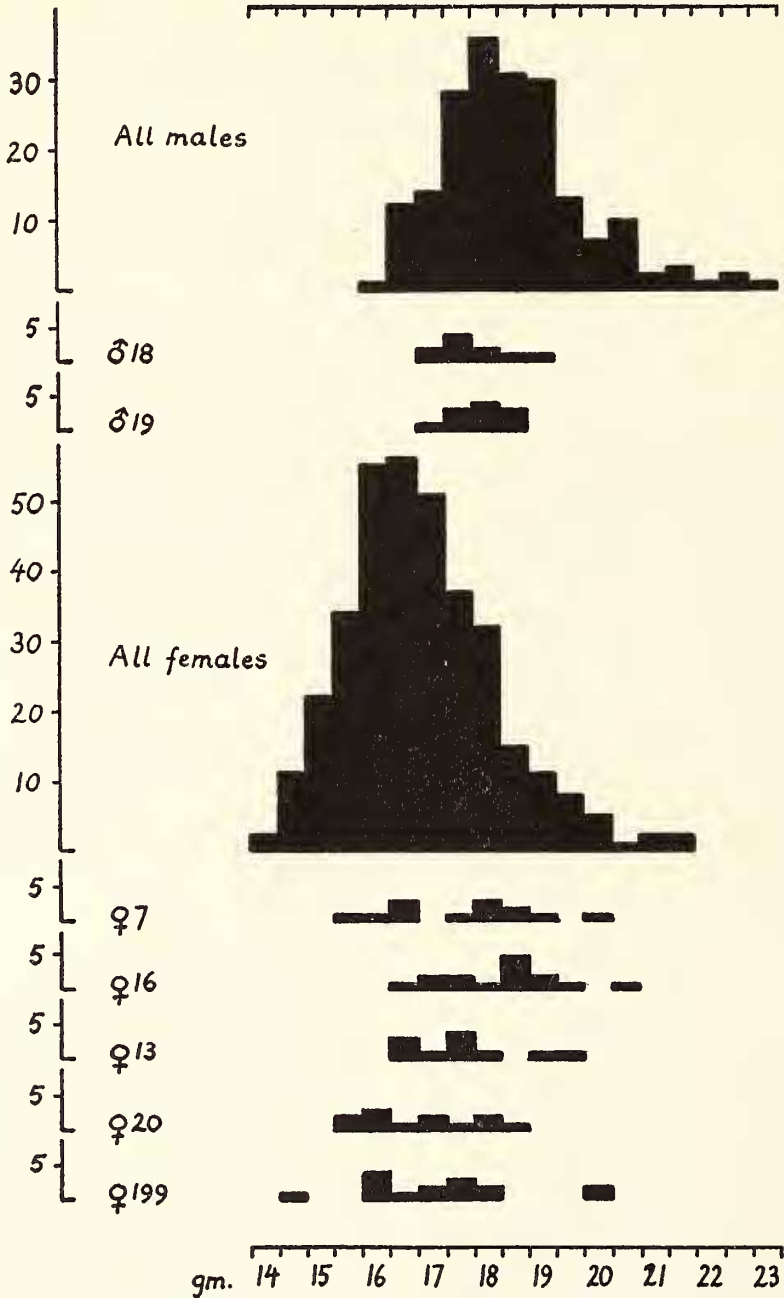
VARIATION IN WEIGHT OF THE SAME INDIVIDUAL

Many individual birds were trapped more than once in the course of the work, some of them several times. This raises the problem whether, in presenting the data, each weight should be included or only one for each individual. If only one weight, *e.g.* the first recorded, is given for each individual, the range of weights is reduced for many species and a considerable amount of variation is lost in which the identity of the individual is of no relevance. For instance, many females were trapped during the breeding season, when they were heavier than usual, and outside the breeding season, when their weight was "normal;" and there were other variations in the weight of the same individual the cause of which was unknown. If the mean weight were given for the individuals trapped more than once, the range of variation of the samples would be even more seriously reduced, though the accuracy of the mean would be improved. Alternatively, it would be possible to include for each individual the greatest and the

least weight recorded, but this would have the opposite effect, of biasing the samples towards the extremes. On the other hand, if all weights are included, those individuals that were weighed more than once will have undue influence on the mean. No completely unobjectionable means of presenting the data seems possible within acceptable limits of space, but on balance

it has seemed best to include all weights, and to indicate after the number in the sample the number of individuals involved, if it is different.

There were more repeated trappings of the same individual Black and White Manakins (*Manacus manacus*) than any other species. Text-fig. 1 shows the weights of those individuals trapped ten times or more compared with the



TEXT-FIG. 1. Weights of *Manacus manacus*. All adult males, all females, and all individuals trapped ten times or more.

whole sample. The two males showed a rather small range of weights, and all the females much more, a difference connected mainly with their breeding activity. For individual females, the heaviest weights were recorded during the egg-laying season, and the lightest just after the breeding season and, in one case, while dependent young were being fed. A series of seven weights of one individual female was especially revealing (weights in grams):

May 23	16.5, 16.5 (two captures on the same day)
June 3	21, 18.5 (two captures, before and after laying)
June 14	17
June 28	16
July 17	15

The greater variability of the females' weights compared with the males' is reflected in the coefficients of variation (7.7 and 7.0 respectively, Table V).

In species of moderate or large size, weighing 20 gm. or more, successive weighings of the same individual males were usually consistent enough for individuals to be characterized as "heavy," "average" or "light" after they had been weighed three or four times. For example, the two male Silverbeaks (*Ramphocelus carbo*) which were trapped four times or more weighed on successive occasions:

- (1) 32.5, 32.5, 33.5, 31, 30, 33 gm.
- (2) 28.5, 30.5, 29, 29.5 gm.

The mean weight of all adult male Silverbeaks was 29.5 gm. Thus the first was rather a heavy bird, the second average. For females, with their greater variability, and for small species, with their smaller range of weight, few individuals were trapped often enough for such differences to be apparent.

A striking but numerically unimportant source of variation in weight was infestation by subcutaneous maggots of *Philornis* flies. These commonly infest nestlings in Trinidad but rarely adults. Two parasitized Black and White Manakins were trapped. One, which harbored nine larvae of varying sizes, weighed 16.5 gm. on capture and 15.5 gm. when it had been ridded of its parasites. The weight of the second bird, with only one very large maggot, was reduced from 17 to 16.5 gm.

DIURNAL VARIATION IN WEIGHT

There was evidence of slight change in weight in the course of the day in three species of which especially large numbers were trapped, *Glaucis hirsuta*, *Manacus manacus* and *Coereba flaveola*. In *Glaucis*, birds of comparable wing-length trapped after midday averaged a little heavier than those trapped before midday. For birds of wing-length 58-60 mm. (almost certainly nearly all females), for which the sample is largest, the difference of 0.3 gm. is statistically significant (Table I). In *Manacus*, 18 individuals were trapped more than once on the same day and omitting one, which laid an egg between its two captures, all except one were either the same weight or a little heavier at the time of their second capture. The average rise in weight from 0700 to 1700 hours was 0.73 gm. In *Coereba* the mean weight of adults rose significantly from 10.25 gm. for birds trapped before 0800 hours to 10.85 gm. for birds trapped after 1600 hours (Table II).

Since our work was entirely with living birds we do not know to what extent the diurnal increase is due to an increase in stomach contents or reserves within the body. But in any case it amounts to only about 5% of the birds' average weight, so that no serious error is introduced by combining, as has been done, weights obtained at all hours of the day.

TABLE I. DIURNAL VARIATION IN WEIGHT IN *Glaucis hirsuta*
(Birds of wing-length 58-60 mm.)

Weight (gm.)	Trapped before midday	Trapped after midday
8	2	1
7.5	6	2
7	26	15
6.5	35	14
6	27	2
5.5	7	—
Total	103	34
Mean weight	6.50	6.79
S.D.	0.55	0.46

TABLE II. DIURNAL VARIATION IN WEIGHT IN *Coereba flaveola*
(All adults, except two egg-laying females)

Weight (gm.)	Time of capture			
	Up to 08.00	08.01-12.00	12.01-16.00	After 16.00
12.5	—	2	—	1
12	1	5	2	2
11.5	4	11	5	2
11	14	26	9	7
10.5	18	27	14	2
10	19	21	2	5
9.5	16	17	2	1
9	4	5	1	—
8.5	—	1	—	—
Total	76	115	35	20
Mean weight	10.25	10.49	10.73	10.82
S.D.	0.72	0.80	0.69	0.79

SEASONAL VARIATION IN WEIGHT

Seasonal changes in weight were detected in females of species of which especially large numbers were trapped, their mean weight being, as would be expected, greater at the egg-laying season than at other times of year. But the differences are not very great, as breeding seasons are long and normally only a small proportion of the females are engaged in egg-laying at the same time. In *Manacus*, for which the largest number of female weights were recorded, the mean of 83 female weights in May-June, the height of the egg-laying season, was 17.11 gm., compared with 16.02 gm. for 50 weights in November-December, the middle of the off-season, a difference of nearly 7% of the over-all mean weight. In the flycatcher *Pipromorpha oleaginea*, 27 females trapped in the months March-June, the main egg-laying season, averaged 11.6 gm., compared with 11.1 gm. for 39 trapped during the rest of the year, a difference of about 4% of the mean weight. Again, as for diurnal variation, it has not seemed necessary to take this source of variation into account in presenting the tabulated data, and in any case the breeding season of many of the species is too poorly known to make such a course practicable.

Adult males showed little seasonal variation in weight, but the mean tended to increase slightly during the moult. In the Golden-headed Manakin (*Pipra erythrocephala*) the large series for the different months reveal that birds trapped during the main period of moult (August-October) were slightly but significantly heavier than those trapped at other times of year (means 13.25 and 12.57 gm. respectively). This difference is due entirely to those individuals that were actually moulting at the time of capture.

Those trapped in the months August-October that were not moulting weighed the same as those trapped in the other months of the year (Table III). In *Manacus* the difference was even greater: the mean weight of moulting adults trapped in August-October was 19.9 gm., and that of non-moulting males in the same months 18.2 gm. A hint of the same was found in other species too: for instance, in *Ramphocelus carbo* the heaviest weights for adult males were nearly all of moulting birds.

Immature males of *Manacus* are a special case. They begin by resembling females both in plumage and weight, being considerably lighter than the adult males (mean of adult males, 18.5 gm.; females, 16.8 gm.). Gradually their weight increases, presumably through the development of the specialized musculature connected with their complex display (Snow, 1962 a), until by the time they moult into adult plumage they have practically reached full weight. For instance, the same individual, trapped in November, 1959 (five months after fledging), weighed 14 gm.; in April, 1960 (still in juvenile plumage), 17 gm.; in June, 1960 (just before moulting to adult plumage), 17.5 gm.; and in adult plumage, in May and August, 1961, 17.5 and 18 gm.

LOCAL VARIATION IN WEIGHT

Some local variations were found, but as the data are few and the subject was not sufficiently studied, they will only be briefly mentioned here. *Manacus*, *Turdus* species and some other birds trapped in flat country near sea level south of the Northern Range were on average lighter than those trapped in the Northern Range, and their wings were a little shorter. For most species the numbers were rather small and there was a

TABLE III. WEIGHTS OF ADULT MALE *Pipra erythrocephala*

Weight (gm.)	All months	August-October only	
		Not moulting	Moulting
17	1	—	—
16	1	—	—
15	8	—	6
14.5	8	2	4
14	25	2	13
13.5	41	6	14
13	56	6	13
12.5	64	10	5
12	51	7	3
11.5	29	3	—
11	6	—	—
10.5	1	1	—
Total	291	37	58
Mean weight	12.79	12.70	13.56
S.D.	0.97	0.88	0.79

considerable overlap between the measurements from the two areas, so that it has not been thought necessary to give them separately. But in *Turdus fumigatus* the difference was so great that they are given separately in the tabulated data that follow. The species concerned were mostly forest birds, and south of the Northern Range they were trapped in mainly cultivated areas. It is possible that less good feeding conditions had resulted in a smaller size. Alternatively, the difference might be genetical and related to the different altitudes of the localities, though if this were so it would imply a surprising degree of genetic isolation between populations only a few miles apart.

Another locality where weights differed from those obtained elsewhere was Chacachacare, a very dry island off the northwest corner of Trinidad. Here the 55 adult *Coereba flaveola* trapped on two visits, in April and October, were on average markedly lighter than those trapped on the main island of Trinidad (Table IV). In wing-length they did not differ from birds trapped elsewhere. On both visits these birds were all moving across an isthmus from one part of the island to another, in a mass movement that was so prolonged and involved so many birds that we suspected a true migration, though *Coereba* has not previously been thought to be migratory.

TABLE IV. WEIGHTS OF *Coereba flaveola* ON MAIN ISLAND OF TRINIDAD AND CHACACHACARE

Weight (gm.)	Main island	Chacachacare
13	1	—
12.5	4	—
12	9	—
11.5	21	—
11	54	2
10.5	58	7
10	45	8
9.5	34	12
9	9	14
8.5	1	3
8	—	5
7.5	—	2
7	—	2
Total	236	55
Mean weight	10.50	9.27
S.D.	0.79	0.98

VARIATION OF WEIGHT AND WING-LENGTH
COMPARED

Table V gives the coefficients of variation of the 18 samples for which the standard deviations of both weight and wing-length have been calculated. The coefficients of variation for each are rather consistent, those for weight being mostly from 6 to 8 and those for wing-length mostly from 2 to 3. But, as Amadon (1943) points out, that does not mean that weight is really more variable than wing-length. Since wing-length is linear and weight three-dimensional, the comparison needed to test this point should be between the coefficients of variation of wing-length and the cube root of the weight. For many of the larger samples represented here this would involve extremely laborious calculations and it has not been attempted.

Within age and sex groups, no positive correlations between individual weights and wing-lengths could be demonstrated, even though some large samples are available (e.g., 239 for adult male *Pipra*). But if all individuals of a species are lumped together, positive correlations are naturally found in species in which the male is longer-winged and heavier than the female. Thus in *Glaucis*, with a large range of weights and wing-lengths, the correlation coefficient was found to be 0.58 ± 0.04 .

SPECIFIC SECTION

Methods

Within a few minutes of being caught, each bird was placed in a cloth bag, the weight of

which had already been recorded, and weighed with a spring balance accurate to 0.5 gm. Regular checking of the weight of the bag was found to be of great importance, especially when weighing small birds, as changes in humidity, which were most rapid in the morning, could result in alterations of up to 2 gm. The spring balance itself was regularly calibrated with laboratory weights, and showed no change in its readings.

The wings were measured in the naturally closed position, with the feathers lying in their natural curvature (the "natural chord" of bird observatory workers).

Statistical treatment

The weights are given in full for samples of five or fewer, weights from the same individual being separated by commas, those from different individuals by semicolons. When more than five weights were obtained, the number in the sample is given in parentheses, together with the number of individuals involved, if different, followed by the range and the mean. If the number in the sample exceeds 20, the standard deviation is then added. Standard deviations are given only for samples of known sex. Data are given separately for age and sex classes, as far as possible. Thus for the manakins, honeycreepers and some tanagers, immature males are given separately from adult males. But juveniles (here defined as birds showing incompletely grown plumage and/or juvenile gape-flanges) are omitted unless a sample of five or more was obtained, as their weights are too variable for one or two alone to

TABLE V. COEFFICIENTS OF VARIATION OF WEIGHT AND WING-LENGTH
IN ELEVEN SPECIES

	Coefficients of variation	
	Weight	Wing-length
<i>Columbigallina talpacoti</i> ♂	7.3	2.1
♀	7.4	2.0
<i>Glaucis hirsuta</i> ♂	7.4	2.7
♀	8.8	2.1
<i>Pipra erythrocephala</i> ♂	7.6	2.1
♀	6.9	2.6
<i>Manacus manacus</i> ♂ ad.	7.0	2.1
♂ imm.	6.9	2.2
♀	7.7	1.7
<i>Turdus nudigenis</i> ♂	7.5	3.4
<i>Coereba flaveola</i> ♂	6.6	2.4
♀	6.5	3.0
<i>Agelaius icterocephalus</i> ♂	5.7	2.8
<i>Tanagra violacea</i> ♂	6.3	3.1
<i>Ramphocelus carbo</i> ♂	7.5	2.2
♀	7.7	2.3
<i>Tachyphonus rufus</i> ♂	5.4	2.5
<i>Volatinia jacarina</i> ♂ ad.	7.2	2.7

be meaningful. Very heavy females, trapped in the breeding season, that were known or suspected to be about to lay eggs, are kept separate from the rest of the samples. In the case of migrant species, the weights are given separately for each month.

Wing-lengths are given for samples of five or more individuals of known sex, only one wing-length (the first recorded) being given for individuals measured more than once, except when there was a change of plumage from immature to adult.

All weights are in grams, and wing-lengths in millimeters.

Columbigallina passerina

Weight. Male: 35.5.

Columbigallina talpacoti

Weight. Males: (38) 40.5-56.5, 48.1. S.D. 3.5.
Females: (36) 35.5-51.5, 44.8. S.D. 3.3.

Wing. Males: (40) 85-91, 87.5. S.D. 1.8.
Females: (40) 82-88, 85.5. S.D. 1.7.

Columbigallina minuta

Weight: Male: 35.5.
Unsexed: 34; 35; 35.5.

Leptotila verreauxi

Weight. Unsexed: 123.

Touit batavica

Weight. Unsexed: (7) 52-59.5, 55.6.

Piaya minuta

Weight: Unsexed: 35.5; 36; 36.

Crotophaga ani

Weight. Males: 104.5; 107, 118.5.
Unsexed: (12) 79-116.5, 100.3. (11 weighed 92-116.5.)

Otus choliba

Weight. Male: 114.5.
Unsexed: 120.5.

Glaucidium brasilianum

Weight. Unsexed: 66; 70; 71; 77.

Steatornis caripensis

Weight. Males: 405; 410; 480.
Unsexed: 375; 375; 410; 425; 435.

Chaetura chapmani

Weight. Unsexed: 25.5.
For fuller details for *Chaetura* and *Cypseloides* species, see Snow (1962 b).

Chaetura cinereiventris

Weight. Unsexed: (43) 12.5-16, 13.8.

Chaetura spinicauda

Weight. Unsexed: (21) 13-18, 14.2.

Chaetura brachyura

Weight. Female: 30.
Unsexed: (10) 17-22, 18.8.

Cypseloides zonaris

Weight. Male: 60.
Female: 74.
Unsexed: 63.5.

Cypseloides rutilus

Weight. Unsexed: 20; 22.

Panyptila cayennensis

Weight: Unsexed: 18.5.

Glaucis hirsuta

Weight. Males: (37) 6-8, 7.3. S.D. 0.54.
Females: (37) 5.5-8, 6.7. S.D. 0.59.
(One bird weighing 7 gm. laid an egg while being weighed, and the sample probably includes a few other egg-laying birds.)
Unsexed: (224) 5-9.5, 7.0. (A few of the birds weighing 7 gm. or more were probably egg-laying females, but most were adult males by plumage and beak-color.)
Wing. Males: (23) 59-67, 64.0. S.D. 1.7.
Females: (27) 55-61, 58.3. S.D. 1.2.

Phaethornis guy

Weight. Males: (9) 6-7, 6.4.
Females: 6; 6.5; 6.5.
Unsexed: (86) 5.5-8, 6.3.
Wing. Males: (12) 60-67, 63.1.

Plthaethornis longuemareus

Weight. Males: (6) 3-3.5, 3.2.
Females: 3; 3; 3.
Unsexed: (23) 2.5-4.5, 3.2.
Wing. Males: (7) 41-43, 42.0.
Females: (5) 42-44, 42.4.

Florisuga mellivora

Weight. Unsexed (female plumage): 6; 6.5.

Anthracothorax viridigula

Weight. Female: 11 (probably egg-laying).

Anthracothorax nigricollis

Weight. Males: (7) 6.5-7.5, 6.9.
Females: (8) 6.5-7.5, 7.1.
Unsexed (female plumage): (12) 6-8, 6.9.
Wing. Males: (5) 64-66, 65.2.
Females: (9) 63-66, 64.7.

Chrysolampis mosquitus

Weight. Males: 4; 4.5.
Unsexed (female plumage): 4.5; 5.

Chlorestes notatus

Weight. Males: (13) 3.5-5, 4.1.
Females: 3.5; 4; 4.
Unsexed (female plumage): (6) 3-4.5, 3.7.
Wing. Males: (14) 49-53, 50.6.
Females: (5) 46-49, 47.2.

Polytmus guainumbi

Weight. Unsexed: 4.5; 4.5.

Amazilia chionopectus

- Weight. Males: 4.5; 4.5; 4.5; 5.
Females: (7) 3.5-5, 4.4.
Unsexed: (16) 3.5-6, 5.0.
- Wing. Males: (8) 51-53, 52.1.
Females: (7) 48-52, 50.0.

Saucerottia tobaci

- Weight. Males: 4; 4.5; 5; 5.
Females: (5) 4-4.5, 4.2.
Unsexed: (83) 3.5-6, 4.7.
- Wing. Females: (6) 48-50, 49.5.

Heliomaster longirostris

- Weight. Males: 6.5; 6.5.
Unsexed (female plumage): 6; 6.5.

Trogon strigilatus

- Weight. Males: 77, 99.

Trogon collaris

- Weight. Female: 56.

Trogon violaceus

- Weight. Males: 55; 55.5.
Females: 48.5, 52.5; 51.5.

Chloroceryla americana

- Weight. Males: (7, 5 different) 28-32.5, 30.4.
Females: 32; 34; 36.5.

Chloroceryle aenea

- Weight. Unsexed: 14.5.

Momotus momota

- Weight. Females: 99, 102, 133 (egg-laying);
110.
Unsexed: (6, 5 different) 102-123,
114.1.

Galbula ruficauda

- Weight. Male: 25.5.
Females: 24; 33.5 (probably egg-laying).

Piculus rubiginosus

- Weight. Males: (6, 5 different) 51.5-59, 55.4.
Females: 52.5; 56; 61.5.

Celeus elegans

- Weight. Males: (6, 4 different) 112-129, 120.3.
Females: (8, 5 different) 93.5-133,
113.9.

Veniliornis kirkii

- Weight. Male: 37.
Unsexed: 35; 36.5.

Dendrocincla fuliginosa

- Weight. Females: (8, 6 different) 31.5-38.5,
34.9, 46 (probably egg-laying).
Unsexed: (67, 41 different) 31-43.5,
37.6.
- Wing. Females: (7) 95-101, 96.3.

Xiphorhynchus guttatus

- Weight. Unsexed: (17, 6 different) 46.5-55,
50.8.

Synallaxis cinnamomea

- Weight. Unsexed: 17.

Certhiaxis cinnamomea

- Weight. Males: 13.5; 14.
Female: 12.5.
Unsexed: 12; 13; 15.5.

Sclerurus albigularis

- Weight. Unsexed: (6, 4 different) 33-37.5, 34.9.

Sakesphorus canadensis

- Weight. Male: 23.5.
Females: 20.5; 24.

Thamnophilus doliatus

- Weight. Males: (21, 19 different) 25-30.5, 28.0.
S.D. 1.5.
Females: (11, 10 different) 26-30.5,
27.8, 32 (probably egg-laying).
- Wing. Males: (18) 68-73, 70.5.
Females: (15) 66-73, 68.5.

Dysithamnus mentalis

- Weight. Males: 12.5 (immature); 14.5.
Female: 13.

Myrmotherula axillaris

- Weight. Males: 7; 8, 8.5; 8, 9.5.
Females: 8; 8.5.

Formicivora grisea

- Weight. Unsexed (female plumage): 6.5; 9.

Sclateria naevia

- Weight. Male: 23.

Myrmeciza longipes

- Weight. Male: 28.5.
Females: 23; 27.

Formicarius analis

- Weight. Male: 62.
Unsexed: 57; 61, 61.5, 62.5.

Pachyramphus polychopterus

- Weight. Males: 19; 21.5.

Pipra erythrocephalus

- Weight. Adult males: (291, 223 different) 10.5-
17, 12.8. S.D. 0.97.
Immature males: (9) 12-13.5, 12.7.
Females: (214, 171 different) 12-16.5,
14.1. S.D. 0.97. Weights of 16 and 16.5
were mainly recorded in the breeding
season (March-August) and were
probably egg-laying birds.
- Wing. Adult males: (183) 52-60, 56.7. S.D.
1.2.
Immature males: (19) 56-60, 58.6.
Females: (46) 54-62, 58.7. S.D. 1.5.

Manacus manacus

- Weight. Adult males: (191, 93 different) 16-23,
18.5. S.D. 1.3.
Immature males: (58, 47 different) 14-
19.5, 17.3. S.D. 1.2.
Females: (344, 106 different) 14-21.5,

16.8. S.D. 1.3. All weights of 19.5 and above were recorded in the breeding season (February-August). Several of these were known to be egg-laying birds, and the others probably were.

The above figures differ slightly from those given in Snow (1962 a). In the earlier paper, in order to examine seasonal variation, weights recorded after 11.00 hours were reduced by 0.5 gm., thus minimizing the effect of the diurnal increase in weight. Here the adjustment has not been made, in order that the figures should be comparable with those for other species. As a result, for each of the three samples the mean given here is 0.3 gm. higher than in the earlier paper. In addition, two of the samples are larger, owing to the inclusion of later records.

- Wing. *Adult males*: (63) 51-55, 52.4. S.D. 1.1.
Immature males: (41) 52-57, 54.9. S.D. 1.2.
Females: (82) 53-57, 54.7. S.D. 0.95.
- Fluvicola pica*
 Weight. *Males*: 12; 12.
Females: 11; 11.5; 11.5.
- Tyrannus melancholicus*
 Weight. *Unsexed*: 44.5.
- Legatus leucophaeus*
 Weight. *Male*: 21.
- Myiodynastes maculatus*
 Weight. *Female*: 50, 68 (egg-laying).
Unsexed: 49.5; 52.5.
- Pitangus sulphuratus*
 Weight. *Males*: 58; 64.5; 67.
Unsexed: 57; 58.5.
- Myiarchus tyrannulus*
 Weight. *Unsexed*: 29; 31.5; 32.5; 33.
- Myiarchus tuberculifer*
 Weight. *Unsexed*: 22.
- Contopus cinereus*
 Weight. *Unsexed*: 13.5; 13.5.
- Empidonax euleri*
 Weight. *Unsexed*: (14, 7 different) 11.5-13, 12.3.
- Myiophobus fasciatus*
 Weight. *Males*: 10; 10; 10; 10.5.
Females: 8.5; 9; 9.5.
Unsexed: 9; 9.5; 10; 10.5; 10.5.
- Platyrinchus mystaceus*
 Weight. *Unsexed*: (9, 4 different) 8-10.5, 9.7.
- Tolmomyias sulphurescens*
 Weight. *Unsexed*: 16.

- Tolmomyias flaviventris*
 Weight. *Male*: 13.
Unsexed: (9, 8 different) 11.5-14, 12.8.
- Elaenia flavogaster*
 Weight. *Males*: (14) 22.5-27.5, 24.6.
Females: 23.5; 24; 24; 25.
Unsexed: (11) 21-27, 25.0.
 Wing. *Males*: (18) 73-84, 78.7.
Females: (6) 74-78, 75.7.
- Myiopagis gaimardii*
 Weight. *Female*: 12.5.
Unsexed: (7, 5 different) 12.5-14, 13.2.
- Sublegatus arenarum*
 Weight. *Unsexed*: 11; 11.5.
- Phaeomyias murina*
 Weight. *Unsexed*: (20) 8-12, 9.7.
- Camptostoma obsoletum*
 Weight. *Unsexed*: (8) 6.5-8, 7.2.
- Leptopogon superciliaris*
 Weight. *Male*: 13.
Unsexed: (17, 6 different) 9.5-13, 11.9.
- Mionectes olivaceus*
 Weight. *Unsexed*: 18.
- Pipromorpha oleaginea*
 Weight. *Males*: (12, 11 different) 11.5-14, 12.5.
Females: (7) 10-11.5, 10.9. 15.5 (egg-laying).
Unsexed: (242, 159 different) 9-14.5, 12.1.
 Wing. *Males*: (16) 62-68, 64.8.
Females: (6) 57-61, 58.7.
- Stelgidoteryx ruficollis*
 Weight. *Male*: 15.
Unsexed: 14.5; 15; 15.5; 15.5; 16.
Juveniles: (7) 12.5-15.5, 13.9.
- Hirundo rustica*
 Weight. *Unsexed*: 16; 18.
 Both birds were trapped on January 11, and were moulting wing, tail and body feathers.
- Thryothorus rutilus*
 Weight. *Males*: 14; 16; 17; 17; 17.5.
Females: 14; 14; 15.
Unsexed: (18, 11 different) 13.5-18.5, 16.8.
 Wing. *Males*: (5) 55-62, 59.4.
- Troglodytes musculus*
 Weight. *Males*: 13; 14.
Females: 13; 13.5.
Unsexed: (16, 13 different) 12.5-15, 13.9.
 Wing. *Males*: (7) 52-55, 52.9.
- Turdus albicollis*
 Weight. *Unsexed*: (45) 45-62.5, 54.1. 66.5 (probably egg-laying female).

Turdus fumigatus

Weight. *Males*: (18, 7 different) 64-75, 70.6.
Females: (13, 7 different) 66.5-83, 75.6.
Unsexed: (93, 66 different) 56.5-80.5, 70.9.

Wing. *Males*: (5) 114-118, 116.0.
Females: (5) 106-119, 112.4.

Weights and measurements given above are for birds from the Northern Range of Trinidad. As mentioned earlier, a few birds from the lowlands of central Trinidad were both lighter and shorter-winged — weights: males 55.5, 59.5; females 71.5, 72.5; unsexed 62; —wings: males 109, 114; females 104, 108; unsexed 108.

Turdus nudigenis

Weight. *Males*: (25) 55-74.5, 61.6. S.D. 4.6.
Females: (9) 56.5-74, 65.6. 75 (egg-laying).
Unsexed: (54, 50 different) 57.5-72, 64.7. 75; 79.5 (probably egg-laying females).

Wing. *Males*: (35) 104-122, 112.8. S.D. 3.9.
Females: (14) 107-113, 109.4.

Platycichla flavipes

Weight. *Female*: 61.5.

Ramphocaenus melanurus

Weight. *Female*: 8.
Unsexed: (9) 8.5-9.5, 9.2.

Cyclarhis gujanensis

Weight. *Unsexed*: (17, 11 different) 26-31.5, 28.8.

Vireo olivaceus

Weight. *Unsexed*: (8, 6 different) 14-16, 14.8.

Hylophilus aurantiifrons

Weight. *Male*: 8.5.
Female: 8.5.
Unsexed: 10; 10; 10; 10.5; 10.5.

Chlorophanes spiza

Weight. *Adult males*: (15, 14 different) 17.5-19, 18.4.
Unsexed (female plumage): (7) 16-19.5, 17.9.

Wing. *Adult males*: (11) 71-75, 73.2.

Cyanerpes cyaneus

Weight. *Adult males*: 13; 14.5, 15; 15.
Unsexed (female plumage): (7) 12.5-16, 13.9.

Cyanerpes caeruleus

Weight. *Adult males*: (8) 12-13.5, 12.5.
Unsexed (female plumage): (6) 11.5-12.5, 12.0. 14.5 (probably egg-laying female).

Dacnis cayana

Weight. *Adult males*: (6) 13-15, 13.8.
Unsexed (female plumage): 12.5; 14; 14.5; 15; 15.5.

Coereba flaveola

Weight. *Adult males*: (34) 9-12, 10.5. S.D. 0.69.

Immature males: 10; 10; 11.5.
Adult females: (24) 9-11, 9.9. S.D. 0.64. 12.5; 13 (egg-laying).
Immature females: (7) 9-11.5, 10.0.
Unsexed adults: (176, 164 different) 8.5-12.5, 10.6.

Wing. *Adult males*: (63) 54-61, 57.7. S.D. 1.4.

Immature males: (8) 53-57, 55.1.
Adult females: (48) 50-59, 54.2. S.D. 1.6.
Immature females: (14) 49-55, 52.4.

Parula pitaiyumi

Weight. *Unsexed*: 8.5.

Dendroica petechia

Weight. *Males*: Nov., 8.5; 9. Jan., 9. Feb., 9; 9.

Females: Nov., 7.5; 7.5; 9. Dec., 7.5. Jan., 8. Feb., 8.

Dendroica striata

Weight. *Unsexed*: Oct., 9 (on coast, probably recently arrived from oversea).

Seiurus noveboracensis

Weight. *Males*: Oct., 16.5; Nov., 17.5. Apr., 14.5; 16.

Females: Oct., 15.5. Nov., 14; 14.5; 14.5. Dec., 16. Apr., 21.

Unsexed: see Table VI.

Wing. *Males*: (5) 75-79, 76.8.

Females: (6) 71-75, 73.0.

Geothlypis aequinoctialis

Weight. *Male*: 14.5.

Setophaga ruticilla

Weight. *Adult males*: Oct., 8. Nov., 7; 7.5. Dec., 7.5. Jan., 7.5; 7.5; 8.

Immature males: Nov., 7.5. Jan., 7.

Females: Nov., 7.5. Feb., 7.5.

Wing. *Adult males*: (5) 63-65, 64.2.

Basileuterus culicivorus

Weight. *Unsexed*: (10, 8 different) 9.5-11, 10.2.

Molothrus bonariensis

Weight. *Males*: 38.5; 39; 40.5.

Females: 29.5; 29.5.

Wing. *Females*: (9) 82-87, 85.0.

Quiscalus lugubris

Weight. *Male*: 76.

Icterus nigrogularis

Weight. *Males*: 49; 50.

Females: 40.5; 44.

Wing. *Females*: (6) 81-92, 87.4.

Agelaius icterocephalus

Weight. *Males*: (27) 31.5-40, 35.4. S.D. 2.0.

Females: (17) 24-31, 26.6.

Wing. *Males*: (25) 82-91, 87.0. S.D. 2.4.

Females: (12) 70-81, 76.6.

TABLE VI. WEIGHTS OF *Seiurus noveboracensis*
(All records, including sexed and unsexed birds)

Weight (gm.)	Month of capture							
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
22	—	—	—	—	—	—	1	—
21	—	—	—	—	—	—	1	—
19.5	—	—	—	—	—	—	—	2
18.5	—	—	1	—	—	—	—	—
18	—	1	—	—	—	—	—	—
17.5	—	2	2	—	—	1	1	—
17	—	1	1	2	—	—	1	—
16.5	2	2	2	1	1	—	—	—
16	—	1	2	—	—	—	1	—
15.5	1	1	2	2	—	1	—	—
15	1	1	7	2	—	—	—	—
14.5	—	6	3	—	1	—	1	—
14	—	1	—	1	—	—	—	—
13.5	—	1	—	—	—	—	—	—
13	1	—	—	—	—	—	—	—
12.5	—	1	—	—	—	—	—	—

Leistes militaris

Weight. Unsexed (female plumage): 38.5.

Tanagra violacea

Weight. Adult Males: (37, 30 different) 12.5-16.5, 14.5. S.D. 0.91.

Females: (6, 4 different) 13.5-16, 14.8.

Unsexed (female plumage): (15, 12 different) 13-15.5, 14.3. 17 (probably egg-laying female).

Wing. Adult Males: (24) 56-62, 58.5. S.D. 1.8.

Females: (5) 54-57, 55.4.

Tangara chrysophrys

Weight. Unsexed: (8, 7 different) 17-20.5, 18.4.

Tangara mexicana

Weight. Females: 20.5; 21.

Unsexed: (11) 18-23.5, 20.9.

Tangara gyrola

Weight. Unsexed: (46, 43 different) 18-24, 20.7.

Thraupis virens

Weight. Male: 33.5.

Female: 35.

Unsexed: (28, 24 different) 31-42.5, 37.1.

Wing. Males: (5) 89-96, 91.8.

Females: (10) 85-92, 88.0.

Thraupis palmarum

Weight. Males: 35; 35.5; 36.5; 37.

Females: 35.5; 37.5; 38.

Unsexed: (32, 29 different) 32-42.5, 38.6.

Wing. Males: (9) 95-98, 96.4.

Females: (6) 87-95, 91.3.

Ramphocelus carbo

Weight. Adult males: (111, 83 different) 24.5-37.5, 29.5. S.D. 2.2.

Immature males: (17) 25-29.5, 27.5

Females: (23) 23.5-31, 27.4. S.D. 2.1. 33 (egg-laying).

Unsexed (female plumage): (63, 53 different) 24-31.5, 27.8.

Wing. Adult males: (87) 76-85, 80.9. S.D. 1.8.

Immature males: (22) 74-83, 79.2. S.D. 2.3.

Females: (43) 72-80, 77.1. S.D. 1.8.

Habia rubica

Weight. Adult males: (19, 11 different) 29.5-35.5, 31.7.

Immature males: 27.5; 31.5.

Unsexed (female plumage): 26.5; 30.5; 32.5; 32.5; 37 (probably egg-laying female).

Wing. Adult males: (9) 88-93, 90.7.

Tachyphonus rufus

Weight. Adult males: (36, 31 different) 31-40.5, 34.9. S.D. 1.9.

Females: (16, 8 different) 33.5-42.5, 37.5. 47.5 (probably egg-laying).

Juveniles: (6) 30.5-35, 33.4.

Wing. Adult males: (34) 82-92, 87.5. S.D. 2.2.

Females: (7) 81-88, 84.7.

Tachyphonus luctuosus

Weight. Adult males: (8, 5 different) 12.5-15, 13.6.

Females: 13, 13.5; 17.5 (probably egg-laying).

Saltator albicollis

Weight. Unsexed: (10) 33-40.5, 37.5.

- Saltator caerulescens*
Weight. Males: 48.5; 51.5; 52.5; 53.
Unsexed: 51; 52; 53.5; 54.
- Tiaris bicolor*
Weight. Adult male: 8.5.
Unsexed (female plumage): 8; 9.
- Tiaris fuliginosa*
Weight. Adult males: (11, 9 different) 11-16, 13.3.
Females: 13; 13; 13; 14.
Unsexed (female plumage): (9) 12.5-14, 13.3.
Wing. Adult males: (13) 58-63, 59.7.
- Sporophila intermedia*
Weight. Adult males: 11; 13.
Immature males: 11; 11.5; 11.5; 13; 13.
Females: 11; 11.5; 11.5; 13.
Unsexed (female plumage): (7) 11.5-14, 12.4.
Wing. Males: (8) 54-57, 55.3.
Females: (8) 52-56, 53.9.
- Sporophila nigricollis*
Weight. Adult males: 9; 9.5.
- Sporophila lineola*
Weight. Adult males: (11) 7.5-12, 9.8.
Immature males: 8; 9; 9; 9.
Females: 8.5; 8.5.
Unsexed (female plumage): (13) 9-11, 9.9.
Juveniles: (6) 8.5-9.5, 8.9.
Wing. Adult males: (10) 55-59, 57.3.
Immature males: (6) 54-57, 55.2.
- Sporophila minuta*
Weight. Adult males: (10) 7-9, 7.9.
Immature males: 7; 7; 7.5; 8.
Females: 7; 7; 8; 8; 8.
Unsexed (female plumage): 7.5; 7.5; 8; 8.5.
Wing. Adult males: (28) 47-51, 48.8. S.D. 1.1.
Females: (13) 46-50, 48.2.
- Oryzoborus angolensis*
Weight. Immature male: 14.5.
Unsexed (female plumage): 12.5; 12.5.

- Volatinia jacarina*
Weight. Adult males: (25) 8.5-11.5, 9.7. S.D. 0.70.
Immature male: 11.5.
Females: 9; 10; 10; 10.5.
Unsexed (female plumage): (12) 8-12, 9.5.
Wing. Adult males: (37) 45-51, 48.3. S.D. 1.3.
Females: (9) 45-48, 46.4.

SUMMARY

Over 4,000 bird weights from Trinidad are summarized. Individual variation and diurnal and seasonal weight changes are discussed. Two species for which there were large samples were found to show a slight increase in weight in the course of the day. Females were found to average slightly heavier during the breeding season than at other times of year. Males showed no appreciable seasonal variation except for a tendency towards an increase in weight during the moult. Local variation within Trinidad was detected in a few species.

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APPENDIX

[This paper is one of a series emanating from the Tropical Field Station of the New York Zoological Society, at Simla, Arima Valley, Trinidad, West Indies. This station was founded in 1950 by the Zoological Society's Department of Tropical Research, under the direction of Dr. William Beebe. It comprises 200 acres in the middle of the Northern Range, which includes large stretches of undisturbed government forest preserves. The laboratory

of the Station is intended for research in tropical ecology and in animal behavior. The altitude of the research area is 500 to 1,800 feet, and the annual rainfall is more than 100 inches.

[For further ecological details of meteorology and biotic zones, see "Introduction to the Ecology of the Arima Valley, Trinidad, B.W.I.," William Beebe, Zoologica, 1952, 37 (13): 157-184.]